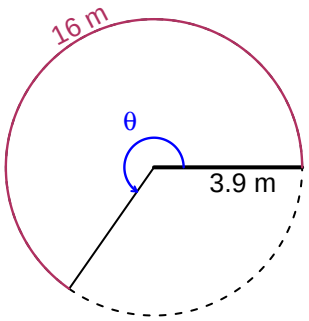
Name: Date:

# Trig Final (SLTN v637)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 3.9 meters. The arc length is 16 meters. What is the angle measure in radians?

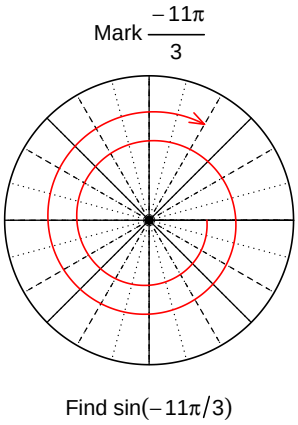



$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

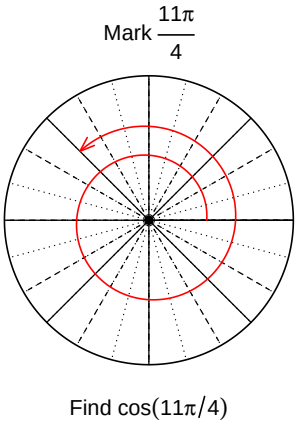
$\theta = 4.103$ radians.

### Question 2

Consider angles $\frac{-11\pi}{3}$ and $\frac{11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-11\pi}{3}\right)$ and $\cos\left(\frac{11\pi}{4}\right)$ by using a unit circle (provided separately).




Find $\sin(-11\pi/3)$




Find $\cos(11\pi/4)$

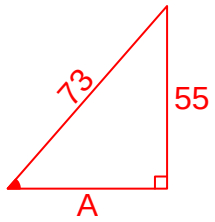
$\sin(-11\pi/3) = \frac{\sqrt{3}}{2}$

$\cos(11\pi/4) = \frac{-\sqrt{2}}{2}$

**Question 3**

If $\sin(\theta) = \frac{55}{73}$, and $\theta$ is in quadrant II, determine an exact value for $\cos(\theta)$.

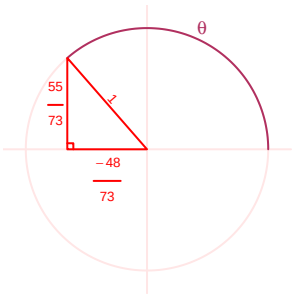
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.




Solve the Pythagorean Equation

$$A^2 + 55^2 = 73^2$$
$$A = \sqrt{73^2 - 55^2}$$
$$A = 48$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.




$$\cos(\theta) = \frac{-48}{73}$$

**Question 4**

A mass-spring system oscillates vertically with a midline at $y = -7.8$ meters, an amplitude of 5.55 meters, and a frequency of 2.21 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height ($y$ in meters) as a function of time ($t$ in seconds).

Any of these equations would get full credit.

$$y = -5.55\cos(2\pi 2.21t) - 7.8$$

or

$$y = -5.55\cos(4.42\pi t) - 7.8$$

or

$$y = -5.55\cos(13.89t) - 7.8$$